€TRAINING

Comprehensive Understanding of Electrical Faults

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Introduction:

This training program offers participants a thorough grasp of various electrical fault types, causes, detection, and remediation methods. It equips individuals with comprehensive strategies to analyze systems, identify faults, and implement effective solutions. Through theoretical learning and practical exercises, participants gain the skills to ensure safe and efficient electrical system operation.

Program Objectives:

At the end of this program, the participants will be able to:

- Learn how to collect in a structured way data and information needed for a power system prior to fault analysis.
- Be exposed to the analytical techniques to study a power system under various types of faults.
- Understand faults, their effect, and different types of calculations involved with short, medium, and a long time of these phenomena affecting the power system.
- Be able to assess the design and functionality of protective equipment.
- Become familiar with the latest software-based approaches to deal with complicated commercial and industrial power systems and their analysis under fault conditions.

Targeted Audience:

- Electricians.
- Design electrical engineers.
- Electrical supervisors.
- Plant electricians.
- Operations & maintenance engineers, supervisors & technicians.
- Maintenance technicians.

Program Outlines:

Unit 1:

Introduction to Fault Analysis:

- Source of fault current and fault statistics.
- Basic assumptions and short-circuit rating of equipment.
- Selecting the correct switchgear rating for fault duties.
- Overview of the per-unit system and one-line diagrams.
- Sources of impedance data for all items of plant and tutorial to demonstrate system preparation.
- Introduction to engineering software used for accurate calculations throughout the course.

Unit 2:

Three-Phase Short-Circuit Currents:

- Manual calculation of three-phase short-circuit current.
- Circuit reduction techniques.
- Industrial systems.
- Electricity supply systems.
- Tutorial - based on attendees plant.
- Cables subjected to short-circuit currents.
- Compliance with regulations.

Unit 3:

Unsymmetrical Fault Conditions:

- Overview of symmetrical components.
- Consideration of various fault types.
- Sequence networks.
- Consideration of phase shift in two-winding transformers.
- Consideration of earth impedance.
- Consideration of three-winding transformers.

Unit 4:

Representation of Unsymmetrical Faults in Power Systems:

- Fault diagrams.
- Interconnected sequence networks.
- Special considerations with reference to limitation of earth fault current.
- Demonstration examples based on industrial power systems.

Unit 5:

Computer-Based Calculation of Faults:

- Introduction to a scaled-down industrial program capable to model complex power systems under fault conditions.
- Use of the software program in practical studies checking manual calculations.
- Industrial standards.
- Case studies of faults in a high voltage network.
- Case study of faults in a low voltage network.